IN THE CLAIMS

This listing of the claim will replace all prior versions and listings of claim in the present application.

Listing of Claims

Claims 1-10 (canceled).

11. (new) A database management method in a database management system which comprises storages, an SQL execution environment which receives a query request to a database stored in said storage and performs a data operation to said database based on the received query request, a resource reserving unit which reserves resources used by said SQL execution environment, a resource releasing unit which releases the resources used by the SQL execution environment, and a program execution environment which communicates with said SQL execution environment, said database management method comprising the steps of:

storing in said storages, a program execution module executed by said SQL execution environment, an SQL execution module, an SQL execution termination module, and programs executed by said program execution environment;

by said SQL execution environment, in response to an input of the query request, referring to a dictionary of management information for the database stored in the storage to acquire a program execution module specified by said query request and definition information referred to by the specified program execution module and determine a program to be executed among said programs;

passing a resource reserving request to said resource reserving unit, said resource reserving request including information for reserving a resource type corresponding to a resource to be used in a program execution process executed by said program execution module as a resource which is non-releasable until process termination of said query request;

by said resource reserving unit, in response to an input of the passed resource reserving request, analyzing the input resource reserving request, resultantly finding that the resource represented by said resource type is non-releasable until the process termination of said query request, and registering said resource type both in a release resource managing table and a resource managing table stored in said storage;

by said SQL execution environment, starting the program execution process by referring to said storages and executing the program execution module referred to thereby, and passing by said program execution process, an execution request of said program preset in said program execution module to said program execution environment;

by said program execution environment, in response to an input of said program execution request, starting a data operation process by referring to said storages and executing said program referred to thereby, and passing by said started data operation process, a data operation request preset in said program to the SQL execution environment;

by said SQL execution environment, determining the SQL execution module corresponding to said passed data operation request, and passing to said resource reserving unit a resource reserving request, said resource reserving request being to reserve as a resource which is non-releasable until

the processing of the data operation request is terminated, a resource type corresponding to said resource used in said SQL execution module;

by said resource reserving unit, in response to an input of the passed resource reserving request,

analyzing the input resource reserving request, resultantly finding that the resource represented by said resource type is non-releasable until the processing of said data operation request is terminated, and registering said resource type in the resource managing table without registering in the release resource managing table;

by said SQL execution environment, executing the SQL execution module determined by referring to the storage;

in a data operation terminating process preset in the execution program, passing to said SQL execution environment, a data operation terminating request representing process termination of the data operation;

by said SQL execution environment, in response to an input of the passed data operation terminating request, executing a SQL execution terminating module corresponding to the data operation terminating request by reference to said storage, and passing to the resource releasing unit, a resource releasing request as a result of execution of the SQL execution terminating module, said resource releasing request being to release the resource used in execution of the SQL execution module; and

by said resource releasing unit, in response to an input of the passed resource releasing request, analyzing the input resource releasing request, resultantly finding that the input resource releasing request represents release of the resource used in execution of the SQL execution module,

4

thereby referring to the release resource managing table and the resource managing table to extract a resource to be released which is registered in the resource managing table but not registered in the release resource managing table, and deleting a resource type matching with the extracted resource, from the resource managing table and keeping to hold an unmatched resource type, whereby the resource to be released and used by the SQL execution module is released and the resource used by the program execution module is kept stored.

12. (new) A computer program stored on a storage medium for conducting database management in a database management system which comprises storages, an SQL execution environment which receives a query request to a database stored in said storage and performs a data operation to said database based on the received query request, a resource reserving unit which reserves resources used by said SQL execution environment, a resource releasing unit which releases the resources used by the SQL execution environment, and a program execution environment which communicates with said SQL execution environment, said computer program, when executed causes said database management system to perform the steps of:

storing in said storages, a program execution module executed by said SQL execution environment, an SQL execution module, an SQL execution termination module, and programs executed by said program execution environment;

by said SQL execution environment, in response to an input of the query request, referring to a dictionary of management information for the database stored in the storage to acquire a program execution module specified by said query request and definition information referred to by the specified program execution module and determine a program to be executed among said programs;

passing a resource reserving request to said resource reserving unit, said resource reserving request including information for reserving a resource type corresponding to a resource to be used in a program execution process executed by said program execution module as a resource which is non-releasable until process termination of said query request;

by said resource reserving unit, in response to an input of the passed resource reserving request, analyzing the input resource reserving request, resultantly finding that the resource represented by said resource type is non-releasable until the process termination of said query request, and registering said resource type both in a release resource managing table and a resource managing table stored in said storage;

by said SQL execution environment, starting the program execution process by referring to said storages and executing the program execution module referred to thereby, and passing by said program execution process, an execution request of said program preset in said program execution module to said program execution environment;

by said program execution environment, in response to an input of said program execution request, starting a data operation process by referring to said storages and executing said program referred to thereby, and passing by

said started data operation process, a data operation request preset in said program to the SQL execution environment;

by said SQL execution environment, determining the SQL execution module corresponding to said passed data operation request, and passing to said resource reserving unit a resource reserving request, said resource reserving request being to reserve as a resource which is non-releasable until the processing of the data operation request is terminated, a resource type corresponding to said resource used in said SQL execution module;

by said resource reserving unit, in response to an input of the passed resource reserving request,

analyzing the input resource reserving request, resultantly finding that the resource represented by said resource type is non-releasable until the processing of said data operation request is terminated, and registering said resource type in the resource managing table without registering in the release resource managing table;

by said SQL execution environment, executing the SQL execution module determined by referring to the storage;

in a data operation terminating process preset in the execution program, passing to said SQL execution environment, a data operation terminating request representing process termination of the data operation;

by said SQL execution environment, in response to an input of the passed data operation terminating request, executing a SQL execution terminating module corresponding to the data operation terminating request by reference to said storage, and passing to the resource releasing unit, a resource releasing request as a result of execution of the SQL execution

terminating module, said resource releasing request being to release the resource used in execution of the SQL execution module; and

by said resource releasing unit, in response to an input of the passed resource releasing request, analyzing the input resource releasing request, resultantly finding that the input resource releasing request represents release of the resource used in execution of the SQL execution module, thereby referring to the release resource managing table and the resource managing table to extract a resource to be released which is registered in the resource managing table but not registered in the release resource managing table, and deleting a resource type matching with the extracted resource, from the resource managing table and keeping to hold an unmatched resource type, whereby the resource to be released and used by the SQL execution module is released and the resource used by the program execution module is kept stored.

13. (new) A database management system comprising:

a plurality of storages for storing data;

a SQL execution environment which receives a query request to a database stored in a storage and performs a data operation to said database based on the received query request;

a resource reserving unit which reserves resources used by said SQL execution environment;

a resource releasing unit which releases the resources used by the SQL execution environment; and

a program execution environment which communicates with said SQL execution environment,

wherein said storages has stored therein a program execution module executed by said SQL execution environment, an SQL execution module, an SQL execution termination module, and programs executed by said program execution environment,

wherein said SQL execution environment, in response to an input of the query request, refers to a dictionary of management information for the database stored in the storage to acquire a program execution module specified by said query request and definition information referred to by the specified program execution module and determines a program to be executed among said programs,

wherein a resource reserving request is transmitted to said resource reserving unit, said resource reserving request including information for reserving a resource type corresponding to a resource to be used in a program execution process executed by said program execution module as a resource which is non-releasable until process termination of said query request,

wherein said resource reserving unit, in response to an input of the passed resource reserving request, analyzes the input resource reserving request, resultantly finds that the resource represented by said resource type is non-releasable until the process termination of said query request, and registers said resource type both in a release resource managing table and a resource managing table stored in said storage,

wherein said SQL execution environment, starts the program execution process by referring to said storages and executes the program execution module referred to thereby,

wherein said program execution process transmits an execution request of said program preset in said program execution module to said program execution environment,

wherein said program execution environment, in response to an input of said program execution request, starts a data operation process by referring to said storages and executes said program referred to thereby,

wherein said started data operation process, transmits a data operation request preset in said program to the SQL execution environment,

wherein said SQL execution environment, determines the SQL execution module corresponding to said transmitted data operation request, and transmits to said resource reserving unit a resource reserving request, said resource reserving request being to reserve as a resource which is non-releasable until the processing of the data operation request is terminated, a resource type corresponding to said resource used in said SQL execution module,

wherein said resource reserving unit, in response to an input of the transmitted resource reserving request, analyzes the input resource reserving request, resultantly finds that the resource represented by said resource type is non-releasable until the processing of said data operation request is terminated, and registers said resource type in the resource managing table without registering in the release resource managing table,

wherein said SQL execution environment, executes the SQL execution module determined by referring to the storage,

wherein a data operation terminating process preset in the execution program, transmits to said SQL execution environment, a data operation terminating request representing process termination of the data operation;

wherein said SQL execution environment, in response to an input of the passed data operation terminating request, executes a SQL execution terminating module corresponding to the data operation terminating request by reference to said storage, and transmits to the resource releasing unit, a resource releasing request as a result of execution of the SQL execution terminating module, said resource releasing request being to release the resource used in execution of the SQL execution module, and

wherein said resource releasing unit, in response to an input of the transmitted resource releasing request, analyzes the input resource releasing request, resultantly finds that the input resource releasing request represents release of the resource used in execution of the SQL execution module, thereby referring to the release resource managing table and the resource managing table to extract a resource to be released which is registered in the resource managing table but not registered in the release resource managing table, and deletes a resource type matching with the extracted resource, from the resource managing table and keeps to hold an unmatched resource type, whereby the resource to be released and used by the SQL execution module is released and the resource used by the program execution module is kept stored.